RK Equity

LITHIUM COST CURVES

RODNEY HOOPER

Fastmarkets MB

“The truth is like poetry and most people hate poetry.”

The lithium industry, unlike other metals, is made up of a vast range of products of differing quality sold at a wide range of prices. Depending on their location and corporate structure, producers effectively pay sales commissions, variable lease payments, import duties and export taxes.

For traditional commodities, cash costs linked to a standardized product have a direct bearing on a company’s profitability.

In the lithium industry, cash costs can be a red herring.

Low cash costs do not guarantee high operating margins or after-tax free cash flows.

RK Equity

PRODUCING ASSETS - COST CURVE ISSUES

- Bifurcation in pricing:
  - for the same product between geographic regions (China / ex-China)
  - battery and non-battery grade
  - between lithium chemicals (carbonate / hydroxide)
  - product (specialty chemical / battery / grease/ceramics)

- Variable royalty/lease rates / export taxes / sales commissions based on the sales price & location = moving target

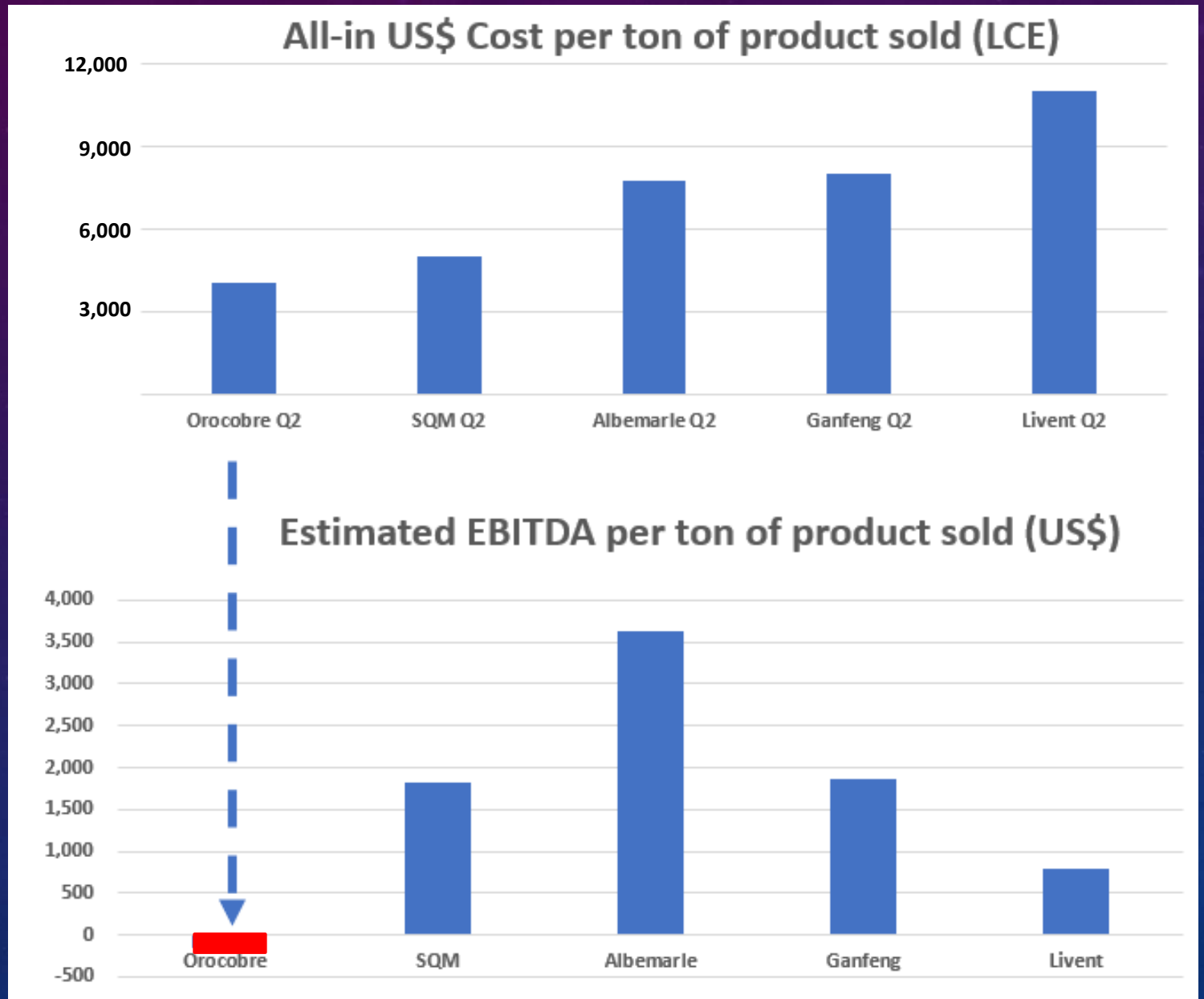
- Variable exchange rates & input costs (diesel, sulphuric acid etc) = moving target

- Variable feedstock costs for non integrated producers (SC6 offtake) = moving target

- Lithium is unique – different cathodes/products means different customer specification sheets & complexity in delivering the required material

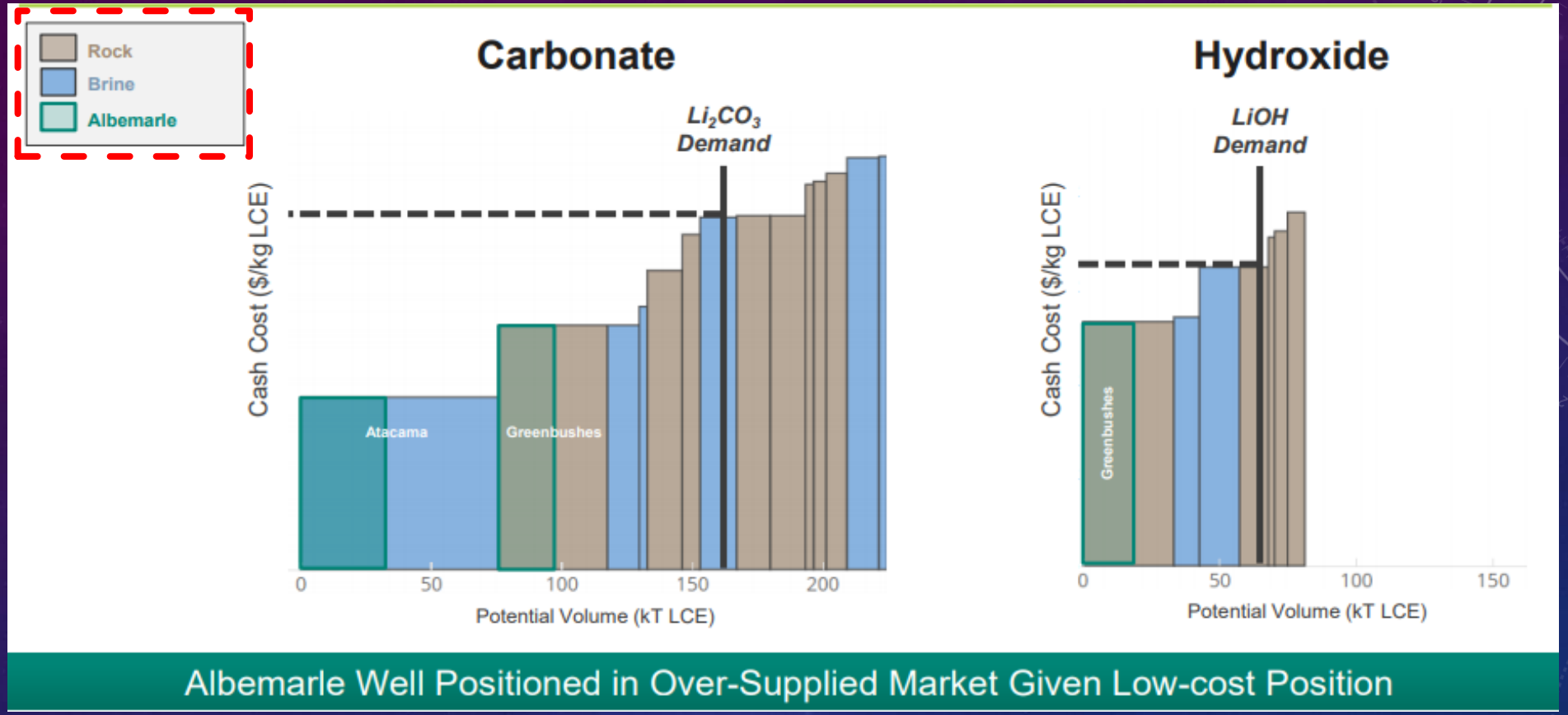
RK Equity

COST PER TON SOLD VERSUS EBITDA MARGIN (Q2 2020)



RK Equity

LOW CASH COST ROUTES TO LI2CO3 & LIOH



- To the extent there is a “standardized” product for battery quality carbonate or hydroxide then cash costs are more highly correlated to breakeven net prices but not completely accurate
- Cash cost curves are only representative of reality for the exact fixed underlying price used in the calculation

RK Equity

ALL-IN COSTS OVER THE PRICE CYCLE (CARBONATE)

Price US$/MT Li2CO3	Lease payment rate
$0 - $4,000	6.8%
$4,000 - $5,000	8.0%
$5,000 - $6,000	10.0%
$6,000 - $7,000	17.0%
$7,000 - $10,000	25.0%
> $10,000	40.0%

SQM Analysis	US$	US$	US$	US$	US$	US$
China Price (VAT Incl)	5,000	10,000	15,000	20,000	25,000	30,000
China Price (VAT Excl)	4,425	8,850	13,274	17,699	22,124	26,549
Less Import duty (2%)	4,338	8,676	13,014	17,352	21,690	26,028
Freight & Insurance	150	150	150	150	150	150
SQM Realized Price	4,188	8,526	12,864	17,202	21,540	25,878
Lease Payment	352	1,372	3,372	5,372	7,372	9,372
Sustaining Capex	400	400	400	400	400	400
Transport	100	100	100	100	100	100
Conv Costs + SGA	2,900	2,900	2,900	2,900	2,900	2,900
All-In COGS	3,752	4,772	6,772	8,772	10,772	12,772
Net Margin	436	3,754	6,092	8,430	10,768	13,106
Margin Inc as % of Price Inc		66.4%	46.8%	46.8%	46.8%	46.8%

All-in Cost per Ton (incl lease/tax/VAT)

SQM

GF

ALB

Companies rotate positions on the cost curve during the price cycle.

Average Sale Price

RK Equity

GREENFIELD PROJECTS – COST CURVE ISSUES

- Cost curve providers are like auditors and do NOT prepare the data – management and their advisors execute feasibility studies
- There is a limited universe of producing assets (for hard rock & brine, ZERO for clay) in diverse locations with diverse flowsheets (junk in, junk out)
- Where a project sits on the cost curve is less important than what its operating margin is – you can go bankrupt sitting at the low end of the cost curve producing a lower value product
- All new projects assume they will qualify all their production into the high price battery supply chain hence the fixation on cash costs & the assumption that a low cash cost = high operating margin

RK Equity

GREENFIELD PROJECTS – VOODOO ECONOMICS?

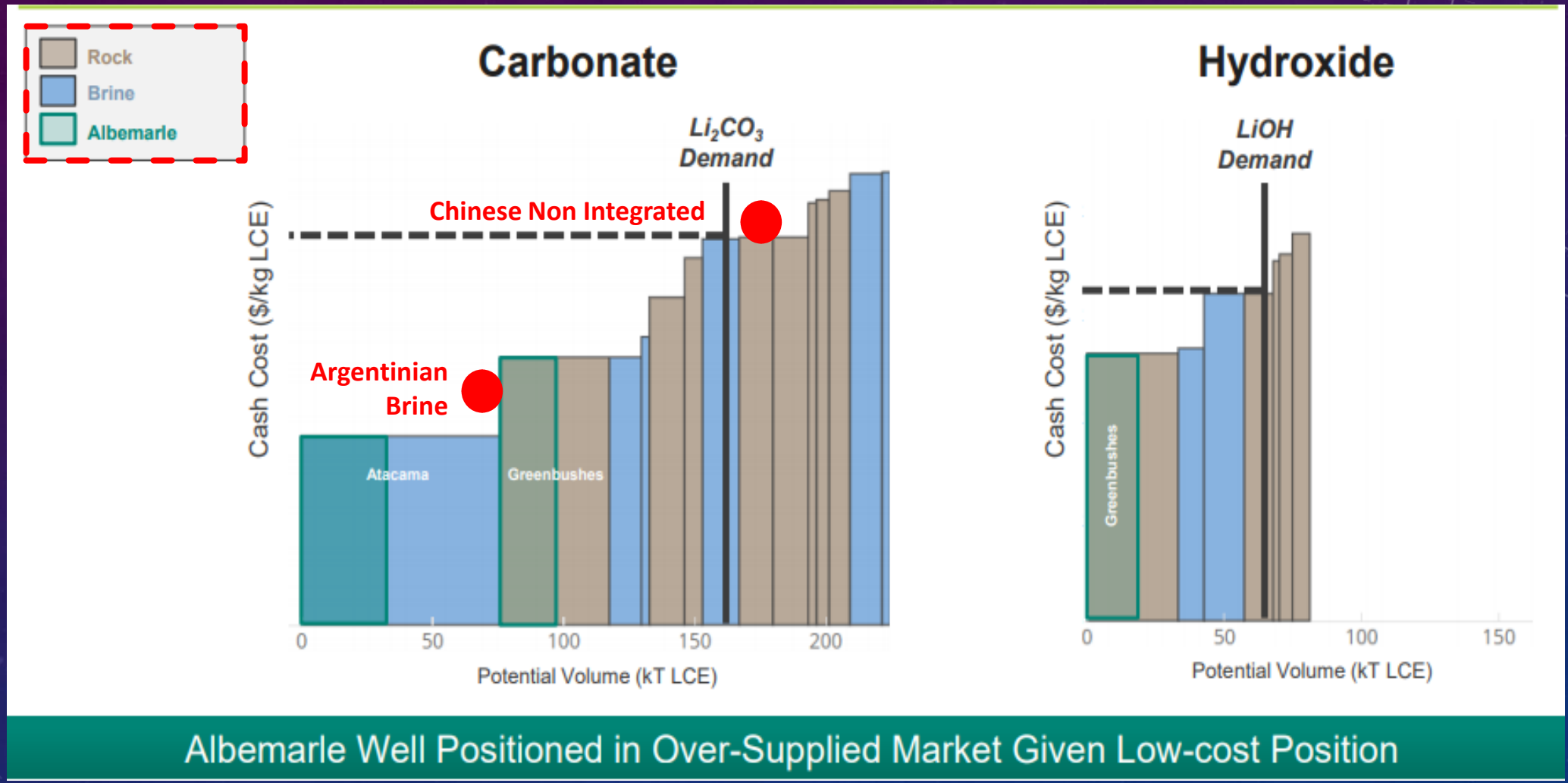
- To secure funding a greenfield project has to generate a sufficient after-tax internal rate of return ("IRR") at the project level

- Evidence suggests 2x WACC or 15%-17% (ALB) is the required IRR for a well established, proven flow sheet

- Cash cost curves for greenfield projects can play a limited role in determining the financial viability (IRR)

RK Equity

GREENFIELD PROJECTS – CASH COSTS VS IRR



Albemarle Well Positioned in Over-Supplied Market Given Low-cost Position

RK Equity

NET PRICE (US$) FOR A PRODUCER SELLING TO CHINA?

China Spot Price (incl VAT)	**12,000**	**12,000**	**12,000**	**12,000**
China Spot Price (excl VAT 13%)	10,619	10,619	10,619	10,619
Import Duty (2%)	(208)	(208)	0	(208)
Freight & Insurance	(150)	(150)	0	(50)
FOB Price (US$)	10,261	10,261	10,619	10,363
Export Tax / Lease Payment/AV	(821)	(1,476)	0	(250)
Net Price to Producer	**9,440**	**8,785**	**10,619**	**10,113**
Producer	**ARG Brine (8% E Tax)**	**SQM (Lease rate)**	**China**	**AUS (5% AV)**

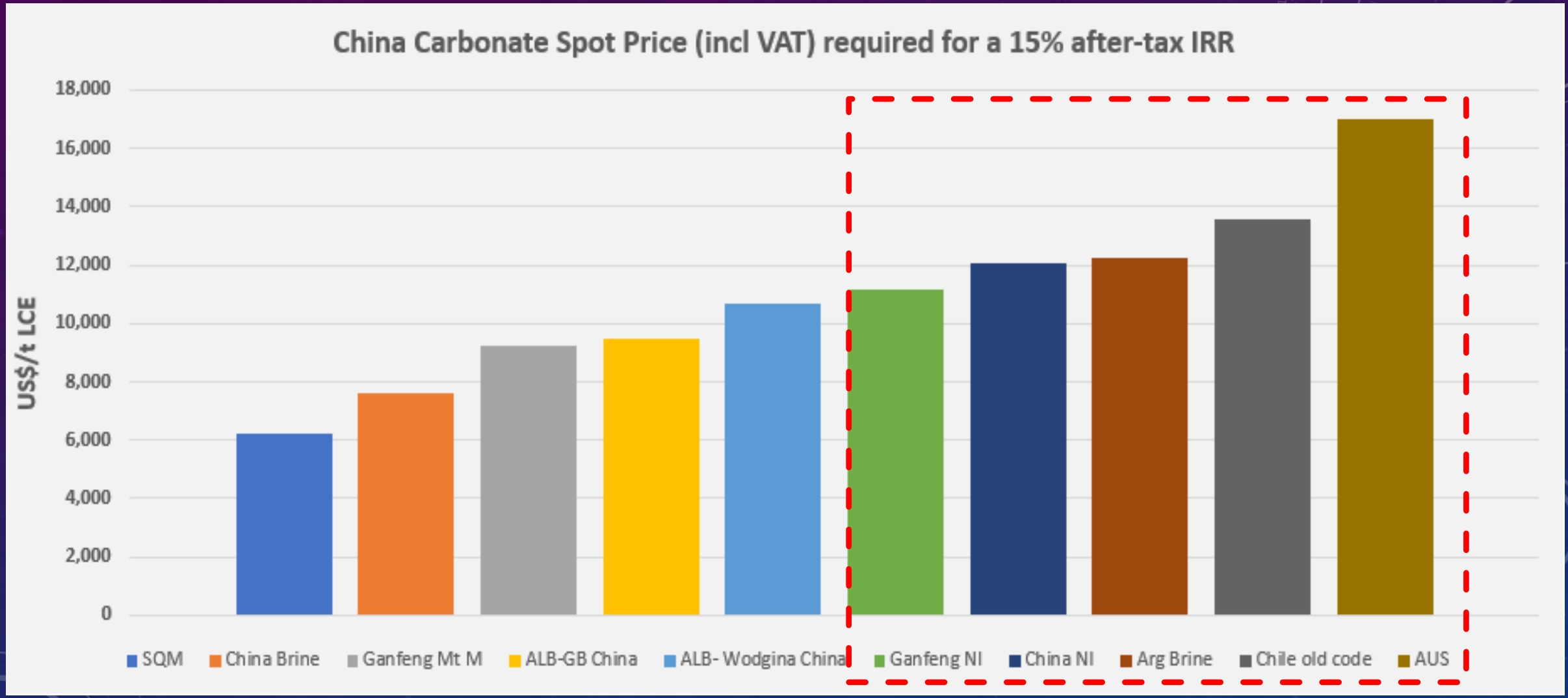
RK Equity

INTERNAL RATE OF RETURN % & CASH FLOW NEUTRAL

Producer	ARG Brine	SQM	China	AUS
Net Price to Producer (US$)	**9,440**	**8,785**	**10,619**	**10,113**
Cash Costs/t + SGA + Transport	(4,000)	(3,000)	(8,400)	(6,000)
EBITDA	5,440	5,785	2,219	4,113
Depreciation (SL / 20 years)	(875)	(250)	(275)	(1,250)
Tax	(1,141)	(1,495)	(486)	(859)
Sustaining Capex ($/t)	(400)	(400)	(400)	(400)
Free Cash Flow (After-tax)	3,899	3,890	1,333	2,854
Capex ($/t)	17,500	5,000	5,500	25,000
Internal Rate of Return	**14.5%**	**41.9%**	**14.5%**	**6.8%**
Breakeven China Spot (incl VAT) Cash Flow Neutral	**5,685**	**4,378**	**7,955***	**7,193**

RK Equity

CHINA LI2CO3 SPOT PRICE (INCL VAT) FOR 15% IRR



RK Equity

FUTURE PRICE & SUPPLY CHAIN IMPLICATIONS

- To meet fast growing battery quality demand growth ~US$12k/t+ China spot prices are needed for companies to generate sufficient free cash flows to fund additional new greenfield supply
- To maximize EBITDA margins in a high lease/export tax location it makes financial sense to build inventories offshore during low prices (SQM) or to ship low quality product & repurify/reprocess near the final downstream client ex-China (ORE)
- Will countries/continents without sufficient local resources (example - EU) ensure the security of supply with incentives & tax/tariff breaks for local chemical conversion/reprocessing?
- **In-country/continent production (& sale) supported by government policy – subsidies/tax breaks & reduced transport costs can result in "Tier 2" projects offering "Tier 1" returns**
- Each producing company has a fluid cash/all-in cost curve depending on various factors – investors need to analyze individual cost curves to properly understand full cycle profitability

RK Equity

THANK YOU

RK Equity

www.rkequity.com
@rodneyhooper13 (Twitter)